

★ BRIEFS ★

Why Nurture Is Natural Too

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Both within and outside generative linguistic circles, it is often claimed that at least two factors determine organismic development, hence determine language development in humans. First, an innate capacity, perhaps species-specific as well, that allows humans (but not e.g. cats) to acquire linguistic systems such as the one you are now using to transduce ‘retinal images’ to meanings. The second factor is, of course, the environmental input. Thus, we have the standard dichotomy ‘nature vs. nurture’. The influence of the environment is amply demonstrated, for example, through naturalistic experimentation indicating that a normal child raised in Japan acquires ‘Japanese’, but one raised in the Philippines develops ‘Tagalog’. Hence, the central role of the environment in language development.

However, it is important to remember—as has been noted before, but perhaps it remains underappreciated—that it is precisely the organism’s biology (nature) that determines what experience, in any domain, can consist of (see Chomsky 2009 (originally 1966) for discussion (and resurrection) of the Rationalist roots of the idea, especially pages 103–105, concerning Cudworth and Humboldt; more recently, see e.g. Gould & Marler 1987, Jackendoff 1994, Lust 2006, Lewontin 2008, and Gallistel 2010). To clarify, a bee, for example, can perform its waggle dance for me a million times, but that ‘experience’, given my biological endowment, does not allow me to transduce the visual images of such wagging into a mental representation (knowledge) of the distance and direction to a food source. This is precisely what it does mean to a bee witnessing the exact same environmental event/waggle dance. Ultrasonic acoustic disturbances might be experience for my dog, but not for me. Thus, the ‘environment’ in this sense is not in fact the second factor, but rather, nurture is constituted of those aspects of the ill-defined ‘environment’ (which of course irrelevantly includes a K-mart store down the street from my house) that can in principle influence the developmental trajectory of one or more organs of a member of a particular species, *given its innate endowment*.

This manuscript was originally drafted in 2006 and has been used in my classroom teaching ever since. A number of people found it to be clarificatory and urged me to make it more widely available than in just my classes. I thank *Biolinguistics* for making this possible and especially two reviewers for helpful comments. Many thanks also to Kleanthes Grohmann, the editor, for his patience, valuable suggestions, and support. I am also indebted to Noam Chomsky. Without his support of this manuscript, it would never have made it outside the classroom. For extensive and invaluable discussion of the ideas expressed here I am very grateful to Elaine McNulty. Thanks also to Hisatsugu Kitahara, Rick Lewis, Jim McGilvray, and T. Daniel Seely for very helpful discussion. All errors are mine.



In the biolinguistic domain, the logic is no different. The apparent fact that exposure to some finite threshold amount of ‘Tagalog’ *acoustic disturbances* in contexts (originating from outside the organism, in the ‘environment’) can cause any normal human infant to develop knowledge of ‘Tagalog’ is a property of human infants. Of course, even here as I seek to clarify, it is misleading but unfortunately terminologically unavoidable that I characterize the acoustic disturbance inputs as ‘Tagalog’ and the knowledge system internalized, as also ‘Tagalog’, inviting the mis-inference that the acoustic input and the state attained (knowledge) are identical, a mis-inference often invited by claiming (even in some generative literature) that “the child is exposed to the language, or to sentences of the language”. The corresponding fact that exposure to a finite number of ‘Japanese’ acoustic disturbances can cause knowledge of ‘Japanese’ to develop in a human, is similarly a hypothesis about properties of human infants (indicating one respect in which they (we) differ from all known objects in the universe). Thus the standard statement that on the one hand, innate properties of the organism and, on the other, the environment, determine organismic development, is profoundly misleading. It suggests that those environmental factors that can influence the development of particular types of organisms are definable, non-biologically—as the behaviorists sought, but of course failed, to define ‘stimulus’ as an organism-external construct. We can’t know what the relevant develop-mental stimuli are or aren’t, without knowing the properties of the organism. Indeed, debates have raged, and continue to rage (I think unnecessarily) regard-ing this very nature–nurture dichotomy. Within the field of Linguistics, broadly construed, this is instantiated by the ongoing and contentious poverty of the stimulus ‘debate’ (where, perhaps importantly, ‘stimulus’ is an illusory and failed behaviorist concept, precisely due to its purely externalist definition). But of course, organism external ‘stimuli’ cannot possibly suffice to explain any aspects of the developed adult state of any organism. In fact, all aspects of an organism’s development involve the organism, including the capacity of the organism to develop differently depending on the ‘experience’ the organism undergoes, or more precisely constructs, given its anatomical properties. It is a (conditionally stated) biological property of a normal human infant that, if exposed to these *noises* (or for sign language, certain *perceived hand shapes* in motion in fact, just photons hitting the retina), then the organism develops one way cognitively. If exposed to others (or none), its cognitive linguistic develop-ment follows another course. Other noises (e.g. jet planes) or perceived motion of limbs (e.g. watching the hands of a performing violinist) have no effect on this particular (i.e. linguistic) aspect of development. That very (slight) develop-mental indeterminacy on the one hand and (infinite) rigidity on the other—and their precise ranges—are defining properties of the organism, in the sense that they cannot be stated independently of the organism. The exact same variant exposure to ‘Tagalog’ vs. ‘Japanese’ finite acoustic disturbances has no corres-ponding effects on the development of a cat, as far as we know. So, in this case, the ‘environment’ is held constant, but the developmental trajectory of the two organisms differs. This then must be due to innate organismic differences in capacities enabling the conversion of experience into growth. The input to the language knower (acoustic disturbances) and the state attained (knowledge of

language) are vastly different, just as the nutritional input given to a tadpole and the frog anatomy it develops are not to be conflated (in this case or in any account of biological development).

Conversely, if the organism is held constant (two human infants) and the exposure is varied (a finite number of 'Tagalog' vs. 'Japanese' acoustic disturbances hitting the eardrum), then any differences in the development of the two infants must be due—not to *'the environment' as is usually confusingly stated*—but to a species-level property by which these variant exposures are mapped to those particular developmental trajectories resulting in particular anatomical (including mental) states. In this sense, 'language variation' (in humans) is, contra much standard locution, innate (biologically constrained), as was instantiated clearly in, for example, the Government and Binding/Principles and Parameters Theory of Chomsky (1981), wherein the parameters (with unspecified values) were of course part of the innate endowment, delimiting the possible range of variation that could in principle be attained. That is, it is a defining property of the species that the possible class of variant developmental trajectories is *determinable* by variant experiences of a particular type. Again, experience is constructed by the organism's innate properties, and is very different from 'the environment' or the behaviorist notion of 'stimulus'. As Kleanthes Grohmann (p.c.) points out, the use of the (organism-independent, externalist) term 'data' in 'primary linguistic data' (Chomsky 1965) may also be misunderstood, as the exact same external data has differential effects on different organisms given their internal constitution (see among others Lightfoot 1989 and much subsequent work). As Descartes importantly noted, regarding the environmental input:

Nothing reaches our mind from external objects through the sense organs except certain corporeal motions [...] But neither the motions themselves nor the figures arising from them are conceived by us exactly as they occur in the sense organs [...] Hence it follows that the very ideas [e.g. phonemes, syntactic categories, meanings, laws, rules, representations, constraints, in fact, all postulates proposed by linguists, none of which occur in the environmental input—SDE] of the motions themselves and of the figures are innate in us. (Descartes 1648/1985: 303–304)

Simply put, the 'environmental input' (for e.g. spoken language) is some finite number of acoustic disturbances, while the cognitive state attained (linguistic knowledge of e.g. syntax, semantics, phonology, morphology, and their interactions) is not acoustic nor does the knowledge system developed by the language learner display finite generative capacity.

Contrary to the implication of the standard nature vs. nurture dichotomy, 'nurture' is then itself definable only in terms of nature, and 'human language variation' is a species property or capacity frequently characterized, inaccurately as: 'that which is not innate'.

As a final note, even though Chomsky himself played a, or more likely, the central role in illuminating this very crucial distinction between 'environment' (or the behaviorist notion of 'stimulus') on the one hand and organismic experience on the other, even his writing does not invariably make explicit the profoundly important and subtle differences he reveals. Thus, for example,

Chomsky (2005: 1) writes that three factors determine human language development: “genetic endowment (the topic of Universal Grammar), experience, and principles that are language- or even organism-independent”. But expressed this way, experience—or more precisely, that which can be experienced, as determined by an organism’s anatomical (including cognitive) constitution, as opposed to that which is experienced by a particular organism (as determined by historical contingency, Chomsky’s clear intent here)—is not entirely transparent.

Thus in addition to distinguishing the externalist notions of ‘environment/stimulus’ from the internalist concept ‘experience’, Chomsky’s revolution importantly embraces two distinct (perhaps confusable) but very closely related interpretations of ‘experience’:

- (1) That which is *experiencable* given an organism’s constitution (see e.g. at least as early as Chomsky 1966 as well as Chomsky 1975).
- (2) That which a particular organism actually happens to experience in its particular lifetime.

The latter is determined by a combination of (i) what an organism can possibly experience as determined by its biological constitution and (ii) historical contingency. Thus the fact that I experienced tokens of the (not invariant) acoustic disturbance ‘cat’ as containing three ordered phonemes, each a bundle of distinctive features, with the initial one mapped to its aspirated allophonic variant, was made possible by my innate language capacities (universal phonology/phonetics), while the fact that I was exposed to these particular acoustic disturbances and not to, say, multiple (acoustically distinct) occurrences of *gato* was an accident of where I happened to grow up.

What I happen to in fact experience is thus necessarily a proper subset of what I can experience, and thus to (at least, ordinally) distinguish the first factor (genetic endowment) from a second factor defined as ‘experience’ may lead (human) readers to a confusing (linguistic) experience, the avoidance of which is naturally worth nurturing. Finally, certain aspects of experience are presumably due to third factor properties of the organism as well, and it is an empirical issue to distinguish which aspects of experience are constructed by uniquely linguistic capacities from those constructed by more general laws, or by some interaction of the two. But, if indeed there are a trinity of factors, as seems unavoidable, then not only is the ‘vs.’ in ‘nature vs. nurture’ a false opposition, but its binarity is singularly unnatural.

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